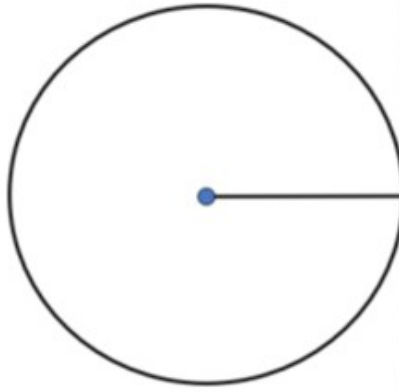
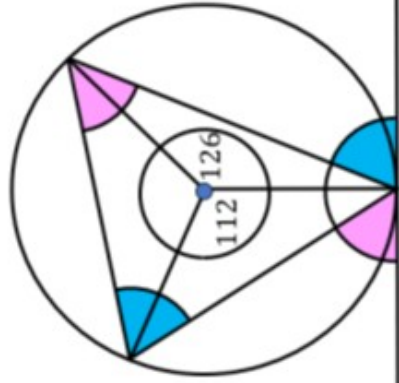
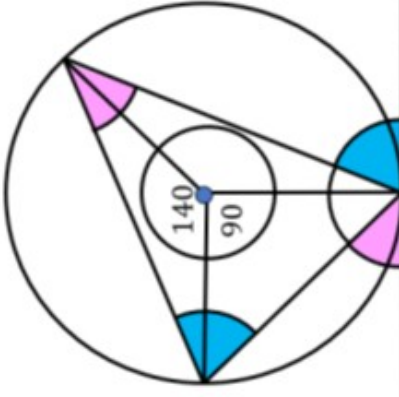
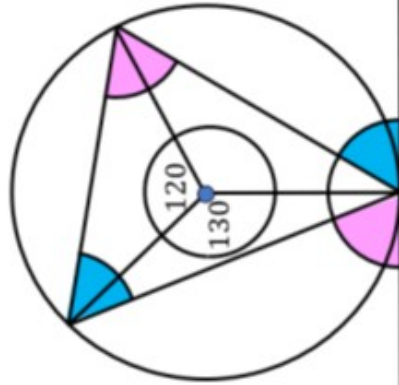


(7) Alternate segment theorem

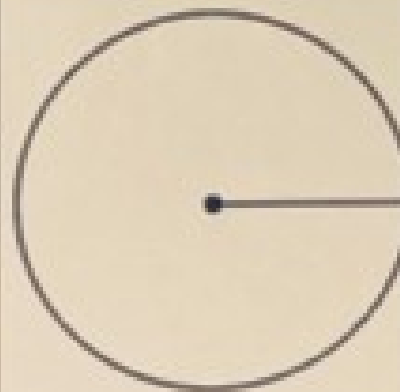
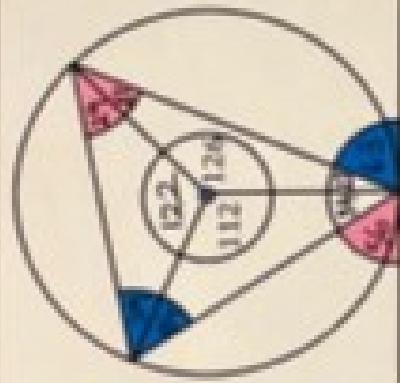
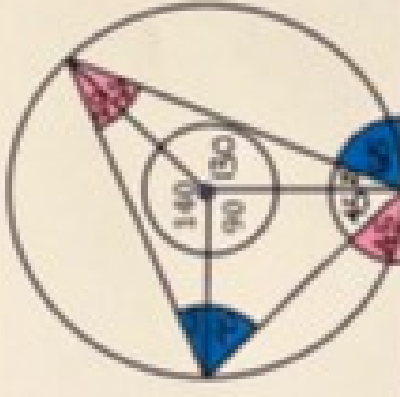
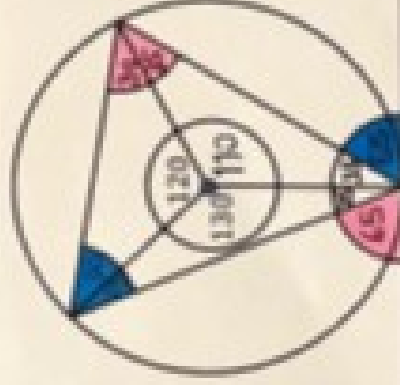
Do now:

The next three diagrams show three joined isosceles triangles inside a circle with a tangent. Calculate all marked angles and write down what you notice about the shaded angles. In the final diagram, choose your own angles and test your theory.

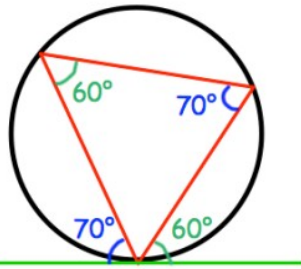


What did you notice?

The next three diagrams show three joined isosceles triangles inside a circle with a tangent. Calculate all marked angles and write down what you notice about the shaded angles. In the final diagram, choose your own angles and test your theory.



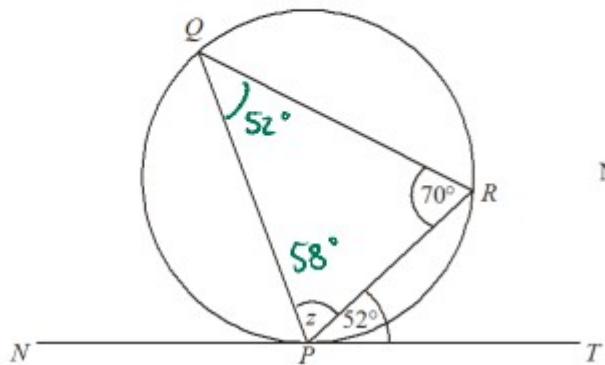
What did you notice? The pink angles are always equal. The blue angles are always equal.



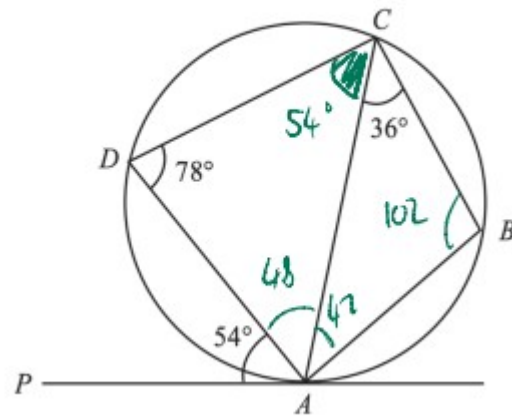
Alternate segment theorem

The angle between the chord and the tangent is equal to opposite angle inside the triangle.

Check your understanding (1)



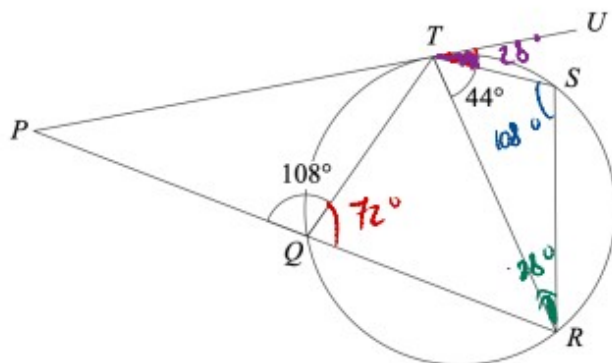
FIND ANGLE ACB



Alternate Segment Theorem

(a)	(b)	(c)	(d)
$a = 65^\circ$	$b = 72^\circ$ $c = 35^\circ$	$d = 50^\circ$	$e = 73^\circ$ $f = 36^\circ$
(e)	(f)	(g)	(h)
$g = 72^\circ$	$h = 65^\circ$ $j = 40^\circ$	$k = 38^\circ$ $m = 52^\circ$	$n = 66^\circ$ $p = 48^\circ$
(i)	(j)	(k)	(l)
$q = 131^\circ$ $r = 16^\circ$	$s = 138^\circ$ $t = 62^\circ$	<p>Find y in terms of x</p> $y = 180 - x$	<p>Find y in terms of x</p> $y = 180 - 2x$

Exam question



Q, R, S and T are points on the circumference of a circle.
 PU is a tangent to the circle at T .
 PQR is a straight line.
 Angle $PQT = 108^\circ$.
 Angle $STR = 44^\circ$.

Work out the size of angle STU .
 You must give a reason for each step in your working.

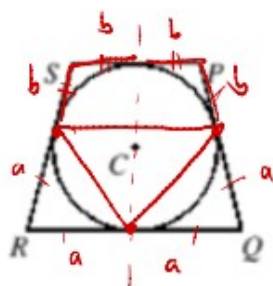
$\angle TQR = 72^\circ$ (ANGLES ON A STRAIGHT LINE SUM TO 180°)

$\angle TSR = 108^\circ$ (OPPOSITE ANGLES IN A CYCLIC QUADRILATERAL SUM TO 180°)

$\angle SRQ = 28^\circ$ (ANGLES IN A TRIANGLE SUM TO 180°)

$\angle SUT = 28^\circ$ (ALTERNATE SEGMENT THEOREM)

$$\begin{aligned} a + b &= 25 \\ \frac{1}{2}(2a + 2b)2r &= 600 \\ 50r &= 600 \\ r &= 12 \end{aligned}$$



[SMC 2012 Q20] In trapezium $PQRS$, $SR = PQ = 25\text{cm}$ and SP is parallel to RQ . All four sides of $PQRS$ are tangent to a circle with centre C . The area of the trapezium is 600cm^2 . What is the radius of the circle?